Name: Key
Student ID: _____

PHARMACEUTICS 531P
Exam I
October 23, 2013
10:30 – 11:20 AM

Part I (1 point each)
Mark **A for TRUE** and **B for FALSE** on your mark-sense form

A,T 1. At present, chemical synthesis is still the main source of small molecule drugs.

A,T 2. Tablet is a pharmaceutical dosage form that can be administered through the sublingual route.

A,T 3. Sucrose readily dissolves in water due to hydrogen bonds between sucrose and water.

A,T 4. Salting out of non-electrolyte occurs because ions of the added electrolyte combine with water to form hydrates, thus reducing the amount of water available for solubilization of the non-electrolyte.

B,F 5. An antimicrobial preservative is required for a fully saturated sucrose solution for storage purpose.

B,F 6. Molecular weight of Na_2SO_4 is 142 g/mole. Therefore, Normality of 2% (w/v) Na_2SO_4 is 0.14 N. (0.28M)

B,F 7. Based on Van't Hoff equation, if a solution gives off heat during the process of dissolution of a solute, solubility of the solute in the solution can be decreased by a decrease in temperature.

B,F 8. In general, salts of organic acids or bases are more soluble in organic solvents than the parent compounds.

B,F 9. If purely based on LogP values of salicylamide (LogP = 0.74) and salicylic acid (LogP = 1.96), we predict that salicylamide possesses a more rapid intestinal absorption rate than salicylic acid.

A,T 10. In general, the lower the pH of a solution, the greater the aqueous solubility of a weak base in the solution.

A,T 11. When equimolar amounts of the buffer acid and the buffer salt are used in a buffer that is made of weak acid and its salt, the buffer capacity is the greatest.

A,T 12. In the case of injecting a small volume (e.g. < 5 ml) of parenteral solutions, the high buffer capacity of the solutions is usually not a big concern.

B,F 13. The NaCl concentration range of 0.5 – 1.8% (w/v) is tolerated to the human blood without major effects.

A,T 14. The 1.9% (w/v) boric acid aqueous solution is isoosmotic, but not necessarily isotonic.

A,T 15. Red blood cells will shrink in a hypertonic solution.

B,F 16. Sterile Water for Injection, USP, can be used for direct injection or infusion.

B,F 17. Because ascorbic acid is a chelating agent, it can be used as an antioxidant.

A,T 18. Vitamin E is an antioxidant because it participates in termination of free radical chain reactions.

19. The main mechanism for benzalkonium chloride to be used as an antimicrobial preservative is that it can denature proteins in bacteria. B, F

20. A parenteral solution that passes a pyrogen test will also certainly pass a sterility test. B, F

21. 0.143 g of $MgCl_2$ (MW = 95.3 g/mole) contains 3 mEq of Mg^{2+} and 3 mEq of Cl^-. A, T

22. By definition, the direction of osmotic pressure is from high to low solvent concentration across a semi-permeable membrane. B, F

23. Two liters of a normal saline solution has an osmolarity of approximately 616 mOSm/L. B, F

24. Readings are made at the bottom of the meniscus when measuring aqueous or alcoholic liquids. A, T

25. Aspirin suppository 5 grains is equivalent to Aspirin 300 milligrams or 325 mg. A, T

26. The sensitivity requirement of a pharmaceutical balance is the maximum change in load that will cause a specified change, one subdivision on the index plate, in the position of rest of the indicating element of the balance. A, T

27. A porcelain mortar and a glass pestle are the best tools for reducing a coarse powder into fine particle-sized powder. B, F

28. Capsules of size 00 are smaller than those of size 1. B, F

Part II. MULTIPLE CHOICE QUESTIONS (2 points each)

Answer the following questions by marking the mark-sense form with the correct choice. No points will be awarded to answers that are marked with more than one letter.

29. Forty six grams of a solute with MW of 46 g/mole is dissolved in 1,000 g of water at 25°C forming a solution with a density of 0.992 g/ml. MW of water is 18 g/mole. Express the concentration of the solution in terms of molality, molarity, mole percent, and percent by weight, respectively.

a. 1.0 m, 0.992 M, 1.77%, 4.40%
b. 0.1 m, 1.0 M, 1.77%, 4.40%
c. 1.0 m, 0.948 M, 1.77%, 4.40%
d. 2.0 m, 2.0 M, 3.54%, 4.40%
e. None of above (a – d)

30. Which of the following statement(s) are **correct**?

i. ✓ Carbon tetrachloride is a non-polar solvent.
ii. ✗ Dipole-dipole interactions between water molecules can be primarily explained by the theory of Lennard-Jones potential
iii. ✓ In general, a drug in a metastable form has a higher aqueous solubility than the drug in a stable form.
iv. ✓ For a given amount of drug powder, the aqueous solubility of the drug usually increases as the particle size of powder decreases.

a. i, ii, iii
b. i, iii, iv
c. iii, iv
d. ii, iii, iv
e. All of the above (i – iv)

31. Phenobarbital is a weak acid with a pK_a of 7.41. In cases of poisoning with Phenobarbital, what are the percent of Phenobarbital **unionized** in the blood plasma (pH 7.4) and in the cerebrospinal fluid (pH 7.3), respectively?

a. 48.5% and 23.5%
b. 35.6% and 40.5%
c. 49.4% and 43.7%
d. 50.6% and 56.3%
e. None of the above (a – d)

32. A buffer is consisted of propionic acid (MW 74.08 g/mole) and sodium propionate (MW 96.07 g/mole). Given pK_a of propionic acid is 1.34×10^{-5} and the total buffer concentration is 0.088 M, the amounts of propionic acid and sodium propionate in two liters of the buffer at pH 5.0 are the following, respectively.

a. 5.54 g and 9.70 g
b. 2.77 g and 4.85 g
c. 10.5 g and 9.7 g
d. 8.5 g and 10.8 g
e. None of the above (a – d)

33. According to the sodium chloride equivalent method, the amount of sodium chloride or anhydrous dextrose needed to make 100 ml of a 1% (w/v) cocaine hydrochloride solution isotonic is the following, respectively: E value of cocaine is 0.14 g NaCl/g cocaine; E value of anhydrous dextrose is 0.18 g NaCl/g dextrose.

a. 0.16 g NaCl or 4.22 g anhydrous dextrose
b. 0.76 g NaCl or 4.22 g anhydrous dextrose
c. 0.76 g NaCl or 0.24 g anhydrous dextrose
d. 0.16 g NaCl or 0.24 g anhydrous dextrose
e. None of the above (a – d)

34. Which of the following statement(s) regarding ophthalmic solutions are **correct**?

i. All ophthalmic solutions require the addition of antimicrobial preservative if there are no available commercial product alternatives.
ii. Sterility and clarity are not just desired properties; they are absolute requirements for ophthalmic solutions.
iii. The normal pH range is 6.5-8.5. The final pH of ophthalmic solutions is often a compromise due to solubility, stability and activity issues for ophthalmic drugs.
iv. The isotonicity of ophthalmic solutions is an absolute requirement.

a. i, ii, iii
b. ii, iii, iv
c. ii, iii
d. i, ii, iv
e. All of the above (i – iv)

35. Which of the following statement(s) regarding pharmaceutical additives are **correct**?

i. ✓ Phenylmercuric acetate is not compatible with certain halides.
ii. ✓ Sodium bisulfite ($NaHSO_3$) is usually more easily oxidized than drugs and therefore could be used as an antioxidant.
iii. ✓ Ethanol added in elixirs may function as an antimicrobial preservative.
iv. ✗ Methylcellulose, USP, is often used in oral solutions as a solvent.

a. i, iii, iv
b ii, iii
(c.) i, ii, iii
d All of the above (i – iv)
e. None of the above (i – iv)

36. A compounded product is to weigh two fluid ounces (2 fl. oz Avoirdupois). The most accurate equivalent in metric weight is:

a. 30.00 ml
(b.) 60.00 ml
c. 120.00 grams
d. 120.00 ml
d. None of the above (a – d)

37. A prescription calls for 50 capsules each to contain 25 mg Ephedrine. The pharmacist decides to use No. 1 size capsules which hold 400 mg material per capsule. To make 52 capsules, calculate the correct weights of drug and diluent, respectively:

a. 13 g and 208 g
b. 12.5 g and 200 g
(c.) 1.3 g and 19.5 g
d. 1.3 g and 20.8 g
e. None of the above (a – d)

38. How many milliequivalents (mEq) of Na^+ need to be added to one liter of Sodium Chloride 0.45% (w/v) to make Sodium Chloride 0.9% (w/v)? (MW of NaCl is 58.5 g/mole)

a. 154 mEq
b. 15.4 mEq
c. 770 mEq
(d.) 77 mEq
e. None of the above (a – d)

39. Powders are dry, finely divided drugs/chemicals intended for:

a. Internal use
b. External use
c. Topical use
(d.) All of the above (a – c)
e. None of the above (a – c)

$$\text{Log}Ks = \frac{-\Delta H}{2.3RT} + J$$

For weak acid

$$pH = pKa + \text{Log}\frac{[Ac^-]}{[HAc]}$$

$$\%\text{ionization} = \frac{100}{1+10^{(pKa-pH)}}$$

For weak base

$$\%\text{ionization} = \frac{100}{1+10^{(pKb+pH-pKw)}}$$

For weak base

$$pH = pK_w - pK_b + \log([B]/[BH^+])$$

1 mole = 6.023×10^{23} molecules

End of Exam Questions